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Cooperative ECONOMIC INSECT REPORT

INSECTS NOT KNOWN

To Occur In The United States

Issued by

PLANT PEST CONTROL DIVISION

AGRICULTURAL RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

SURVEY AND DETECTION OPERATIONS

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United States Department of Agriculture
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Hyattsville, Maryland 20781

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

(150-161 of Series)

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This series was initiated early in 1957 as an aid to strengthening the detection program against foreign insect pests not known to be established in this country. The statements have been released individually in the Cooperative Economic Insect Report; but, due to requests for complete sets of the series, the separates published during a year have been assembled under one cover at the close of that year. This is the seventh such compilation. The separates will continue to appear periodically in the Report. Preparation of this material has been made possible through the generous cooperation of the Plant Quarantine and Entomology Research Divisions, ARS, the U.S. National Museum and individual cooperators.

A consolidated index of the seven compilations is included with this issue. Recent nomenclatural changes of scientific names are also included.

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INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

BARLEY APHID (Cuernavaca noxius (Mordvilko))

Economic Importance: This aphid has been a pest of small grains in areas of southern Russia (U.S.S.R.) for many years. In the Crimea, this species caused enormous damage in 1912, decreasing the harvest in the area infested by 75 percent. Earlier, in 1900, it was responsible for a loss amounting to 76 percent of the barley crop. The barley aphid only recently has been reported as a major pest of small grains in Turkey where it caused heavy damage to wheat and barley in the Konya area (south central) in 1962. It infested small grains throughout Libya that same year, and a medium infestation of this species, Macrosiphum avenae and Sipha agropyrella was reported in 1961 from Afghanistan on wheat. In the spring of 1945, C. noxius heavily infested barley and wheat in the valley of Soton, Huesca Province, Spain.

Damage by C. noxius is greatest when the crops begin to ripen, and numbers increase substantially at that time. Damaged fields of small grains have a purplish tinge. In the Crimea, the chief damage occurs in June, barley being damaged greater than wheat because the latter crop is usually well developed and the ears have partly emerged from the sheath. In heavily infested barley, the development of the ear is delayed and the upper two or three leaves often do not unfold. Damage may amount to a total loss of harvest in the case of young barley, or to a considerable decrease in the case of wheat or older barley.

Synonymy: Brachycolus noxius Mordv.; Cavahylopterus graminearum Mimeur ; and Cavahylopterus noxius (Mordv.).

Distribution: U.S.S.R. (Ukraine, Caucasus, Crimea, Kazakhstan), Turkey, Iran, Afghanistan, Israel, United Arab Republic (Egypt), East Africa, Southern Rhodesia, Libya, Morocco, Spain and Great Britain.

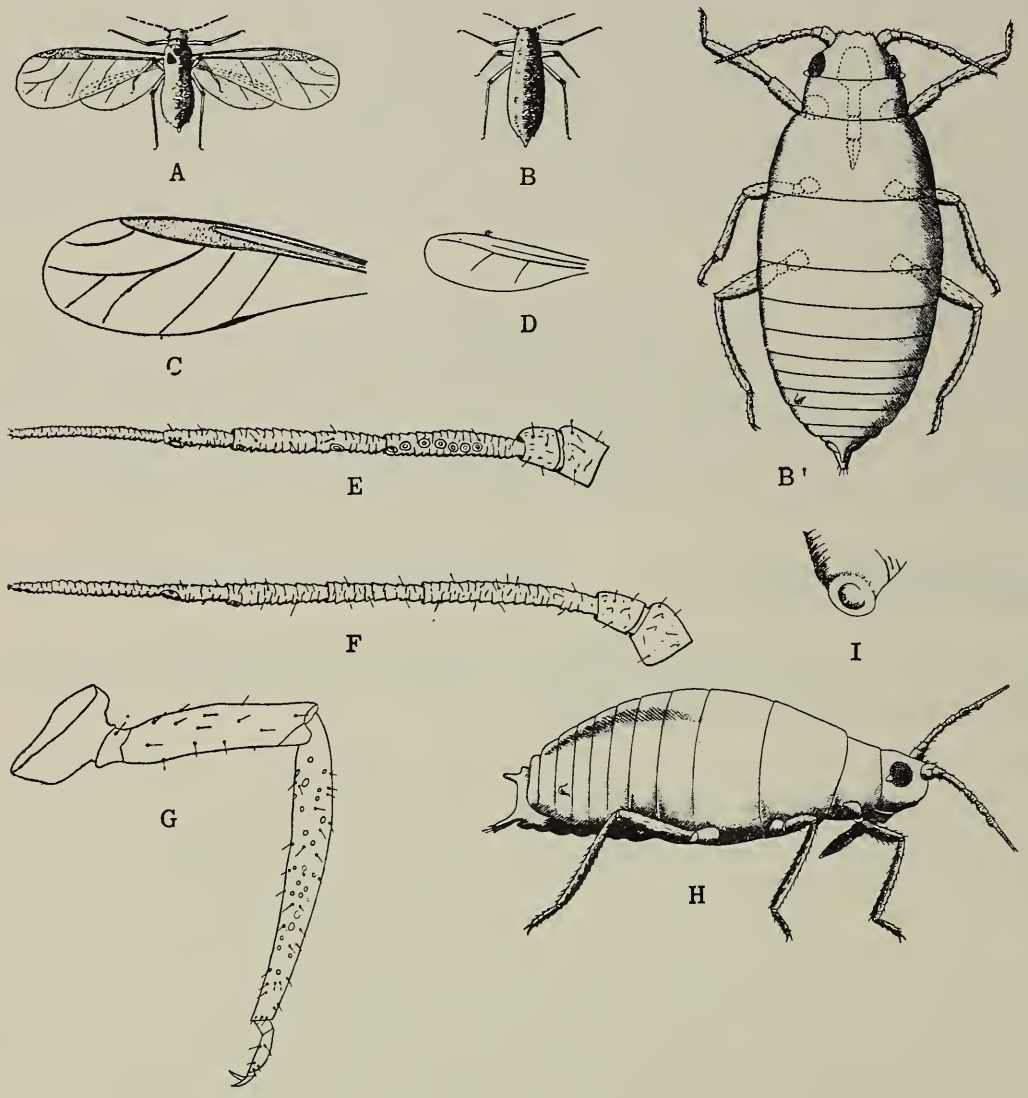
Hosts: Barley and wheat appear to be the most important. Also recorded on oats, rice, corn, sorghum, brome, canarygrass, wheatgrass and other native grasses.

Life History and Habits: The biology as studied in the Crimea is as follows: Aphids appear in the spring and live at the base of the inflorescence or inside the sheath of the covering leaf when the colonies are small. Later, when the crops ripen and the numbers increase, they concentrate on the green parts of the plant, tip of inflorescence, or as low down as the first node of the stem. In June, colonies consist of adult parthenogenetic wingless females, immatures and winged colonizing females. In captivity, wingless individuals live 15 or 16 days and winged ones 12 to 14 days. Migration of winged adults takes place usually during the morning. Peak populations are present when the grain is nearly mature, with numbers decreasing rapidly after harvest. Colonies subsist on the residue of the crop or on native grasses for the remainder of the season. Sexual forms appear the first part of October and are present until the first frosts, with the resulting eggs hatching the next spring.

Description: Cuernavaca is similar to the genus Hyalopterus (rusty plum aphid, H. pruni (Geoffroy) is an example), but differs in possessing short cornicles and by the presence of a supra-caudal process on the eighth tergum. Cuernavaca noxius (Mordvilko) WINGED FORM: Head: Light brown. Frontal tubercles not well developed; compound eyes black. Antenna light brown, base of third segment lighter. Number of sensoria on third and fourth antennal segments 6 (ranging 4-8) and 2 (ranging 1-3), respectively; fifth segment without secondary sensoria. Apical rostral segment without secondary hairs. Thorax: Brown. Wing venation normal. Legs light brown; first hind tarsal segment with two hairs. Abdomen: Light green.

Aphidae, Hemiptera

Lateral sclerites faintly indicated in mounted specimens; cornicles very short, vasiform and light green. Cauda light green; anal plate brown. Supra-caudal process present on eighth tergum with 2 hairs. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies.)



Figures of Cuernavaca noxius (Mordvilko): A - Winged adult. B & B' - Wingless adult, dorsal view. C - Forewing. D - Hind wing. E - Antenna of winged adult. F - Antenna of wingless adult. G - Hind leg of oviparous female. H - Wingless adult, lateral view. I - Cornicle.

Major References: 1. Alfaro, A. 1947. Bol. de Path. Vegetal y Ent. Agr. 15:125-130. 2. Bodenheimer, F. S. and Swirski, E. 1957. The Aphidoidea of the Middle East. pp. 287-288, Jerusalem. 3. Grossheim, N. A. 1914. Nat.-Hist. Mus. of Zemstvo of Govt. of Taurida Mem. pp. 35-78, Simferopol. 4. Habib, A and El-Kady, E. A. 1961. Soc. Ent. Egypt. Bul. 45:115-116. 5. Linkfield, R. L. and Damiano, A. 1963. U.S. Dept. Agr. Coop. Econ. Ins. Rpt. 13(5):76. 6. Millet, E. R. 1962. Ibid. 12(4):44. 7. Mimeur, J. M. 1941 Soc. des Sci. Nat. du Maroc Bul. 21:67-70. 8. Philips, F. M. 1963. U.S. Dept. Agr. Coop. Econ. Ins. Rpt. 13(5):69.

Illustrations from Alfaro and Mimeur.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

INDIAN SUGARCANE LEAFHOPPER (Pyrilla perpusilla (Walker))1/

Economic Importance: This fulgorid planthopper is one of the most destructive pests of sugarcane and corn in Pakistan and India, and is common in Afghanistan. Adults and nymphs suck plant juices from the underside of the leaves and retard plant growth if not checked. The pest is capable of reducing the sucrose content of the juice of sugarcane by about 1.5 to 2 percent or even more. Honeydew is also sometimes a problem. In addition, cattle refuse to feed on sugarcane, corn and sorghum damaged by this pest. In 1953-1954, a scheme costing 1,071,000 rupees was organized to control the pest in the Peshawar Region of Pakistan. Seventy thousand acres of sugarcane and fifty thousand acres of corn were treated that year, which resulted in a saving of approximately 6 million rupees. Recently, Fennah (4) made a study of the species of the genus Pyrilla Stål found in Ceylon and India. He concluded that two polytypic species are present: P. perpusilla (Walker), widespread in India and now recognized as extending to Ceylon and to Thailand, and P. aberrans (Kirby) (strict sence), formerly regarded as being confined to Ceylon, but now found to occur also in south India. Fennah described and named 10 geographical subspecies of the former and 5 of the latter. Included is P. perpusilla pusana (Distant) which is represented by 3 color forms, each predominant in the population at a particular period of the year.

Indian Sugarcane Leafhoppers on Sugarcane Leaf

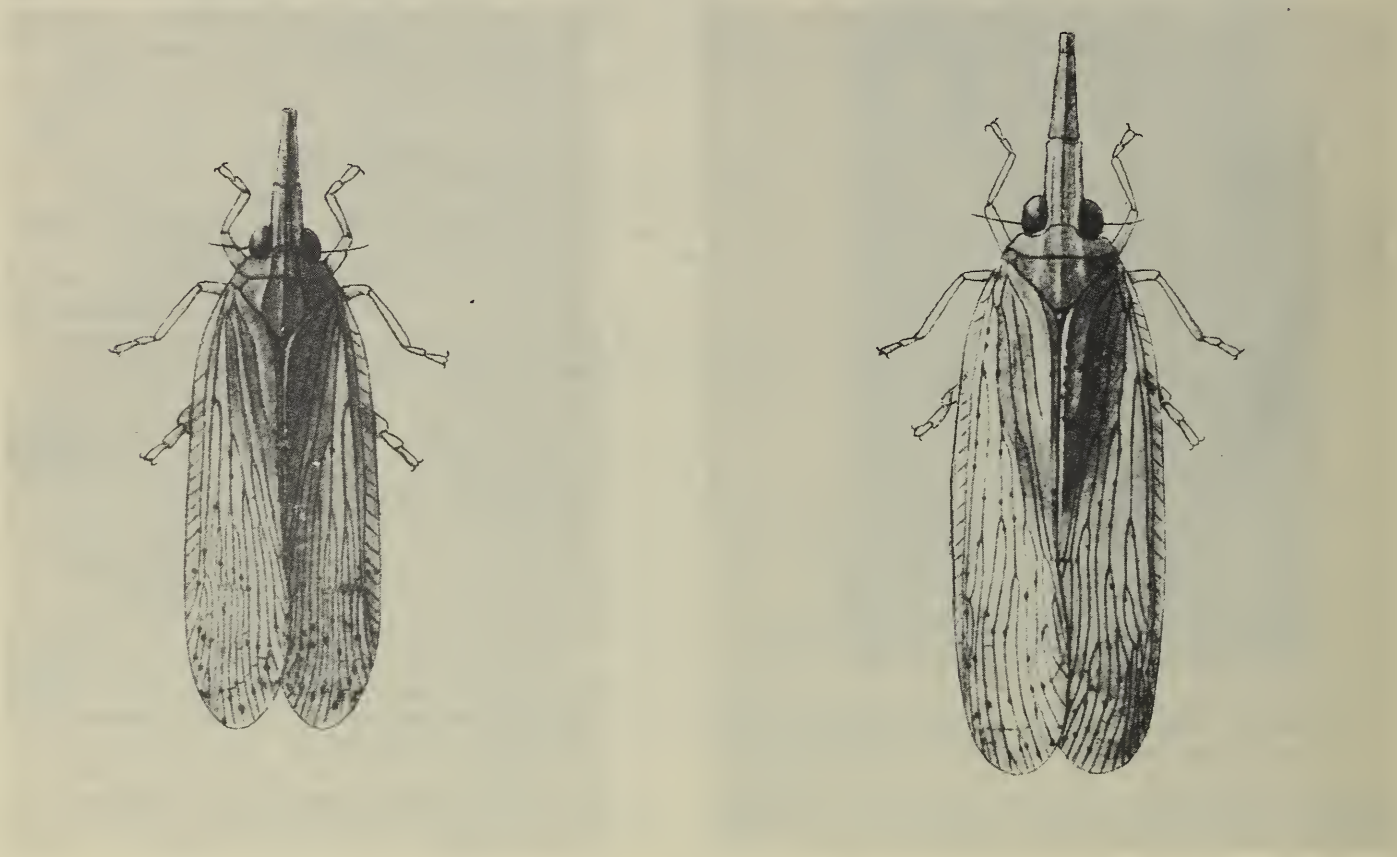
Hosts: Sugarcane, wheat, barley, oats, sorghum, corn, Sudan grass and other native and cultivated grasses.

Distribution: India, Pakistan, Afghanistan, Ceylon and east to Thailand.

Life History and Habits: Females lay up to 773 eggs. They are laid in clusters on the host plants and are covered with whitish, fluffy material. Eggs hatch in 7-12 days during April-October and 20-41 days during November-March. There are 5 nymphal stages. The nymphal stage occupies 24-65 days during April-September and 78-208 days during October-March. The pest has 3-4 broods a year; the last two (when present) overlapping each other. Adults are most common during late March. Eggs are laid on sprouting sugarcane in April. From May to December, all stages of the pest are encountered, but from January to the latter part of March, nymphs predominate. When sugarcane is harvested, the pests migrate to other susceptible crops such as wheat, barley, oats and other grasses. When the small grains are harvested, they migrate to sugarcane, corn and sorghum.

1/ Also called sugarcane pyrilla
Homoptera:Fulgoroidea:Lophopidae

Description: ADULT (P. perpusilla perpusilla (Wlk.)) - Body and legs ochraceous, paler beneath than above; termina yellowish-white, semi-opaque, apical area and outer claval margin speckled with minute black spots; wings pale hyaline; dorsal ridge to cephalic process much less prominent in front of the central trasverse ridge than behind it. Length (excl. tegm.) 9 mm. or three-eighths of an inch. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies.)



Male and Female of Indian Sugarcane Leafhopper (Pyrilla perpusilla (Walker))

Major References: 1. Abbas, H. M. and Hasnain, A. Z. 1958. Nat. Agr. Chem. News and Pesticide Rev. 16(4):11-12, 18 pp. 2. Aggarwala, D. 1943. The Fungus Diseases and Insect-Pests of Sugarcane. pp. 53-58, Bihar. 3. Distant, W. L. 1906. The Fauna of British India--Rhynchota. Vol. 3. Heteroptera-Homoptera, 503 pp. 4. Fennah, R. G. 1963. Bul. Ent. Res. 53(4):715-735. 5. Rahman, K. A., and Nath, R. 1940. Bul. Ent. Res. 31(2):179-190.

Figures: Male and female from Pruthi, H. S. 1937. Ind. J. of Agr. Sci. 7(3): 511-512, plate 44.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

SAFFLOWER FRUIT FLY (Acanthiophilus eluta (Meigen))

Economic Importance: The safflower fruit fly (Acanthiophilus eluta (Meigen) (= A. helianthi (Rossi)) is historically one of the most important pests of safflower in the Old World, and is readily found breeding on native composites over most of its range. It has been reported as the most important pest of safflower in southeastern U.S.S.R., and up to 90 percent of the fruits become infested in Rumania. About the middle of March 1939, larvae of A. eluta were found seriously damaging the flower heads of some varieties of safflower in experimental plots at New Delhi, India. Serious damage was reported to both early and late-sown varieties, the infestation being as high as 90 percent. Safflower was introduced into the south of France as an oilseed crop in 1942, but was so severely attacked by this fruit fly that by 1953 it had almost ceased to be grown. Losses of 40-50 percent were observed at Tarascon in 1958, and 90-95 percent of the flower heads of an experimental crop at Montfavet were attacked in 1959.

The maggots of A. eluta feed upon the essential organs of the florets and even bore into the torus (receptacle) of safflower. The infested bud begins to rot and the fluid thus produced oozes out from its apical portion and gives it a damp appearance. Furthermore, in advanced stage of attack, the florets become black, presenting an emaciated and withered appearance.

In 1961, safflower, as an oil crop, was being grown on about 420,000 acres in the United States, about half of which was in California. By 1962, production was expected to increase to about one-half million acres. Based on the rapidly increasing safflower acreage, A. eluta may be a potential threat if introduced in the United States.

Distribution: Ranges from England and the Canary Islands across southern and central Europe and North Africa (from Morocco to the Sudan, Ethiopia (Eritrea) and Kenya) to Turkey, Israel, Iran, U.S.S.R., India, and the Northwest Himalayas.

Hosts: Recorded on safflower (Carthamus tinctorius), C. lanatus, centaurea (Centaurea spp.), bristlethistle (Carduus spp.), bull thistle (Cirsium lanceolatum), Cnicus lanceolatus, illyrian cottonthistle (Onopordum illyricum), Leuzea conifera, blessed milkthistle (Silybum marianum) and other wild hosts of the tribe Cynareae, Compositae.

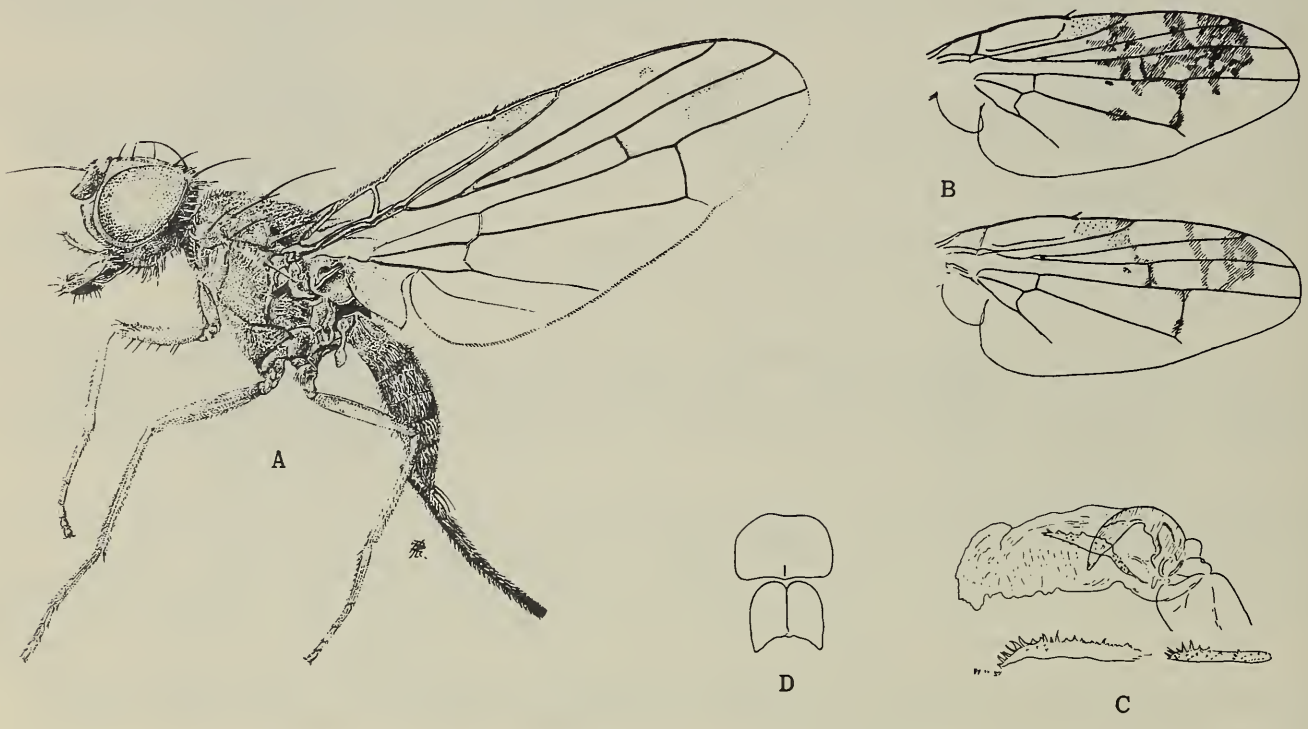
Life History and Habits: The biology as studied in France was as follows: Two generations a year are produced. Females appeared in late May and early June and oviposition occurred in June, the eggs being laid in batches of 6-20 in slits cut with the ovipositor in the lower part of the bracts of the young flower heads. Larvae hatched in 1-2 days and fed in heads, completely hollowing them out. Larval development lasted 8-12 days, and pupation took place in the flower head; adults emerged 9-10 days later. As the flower heads developed, eggs were laid in the upper part, and the damage done by the larvae was then less extensive; some florets survived to set seed. The first-generation adults emerged at the end of June, at which time the flowers were opening. Eggs were laid in July and larvae developed, but the damage by the second generation was relatively unimportant.

Earlier studies in India stated that the pest was very active during March, April and May in the field. Laboratory studies to determine the duration of the various stages (average of 5 readings) at maximum and minimum temperatures of 85.2° F. and 78.5° F., respectively, were made. The egg stage lasted 25 hours and larval and pupal stages 7 days each. In the safflower season, the fly completed 3 generations in 6 weeks, from the middle of March to the first week of May. Additional generations occur on wild hosts during the growing season.

Life history studies in U.S.S.R. by Rusanova (6), though incomplete, suggest that A. eluta may overwinter as an adult.

(Tephritidae, Diptera)

Description: LARVA - Full-grown stage 5 mm. long and 1.5 mm. wide; shape typical of tephritids. Anterior spiracles cup-shaped, margin of each spiracle being fringed with 6 oval lobes. Posterior spiracles almost reniform, each possessing 3 elongated oval slits which are notched at peripheral end. Inner walls of slits chitinized and fimbriated. In each inter-spiracular area, 1 to 4 very minute hyaline lanceolate processes present. Apical tooth of oral hooks curved and pre-apical tooth, which is smaller and less curved, directed downwards and somewhat backwards. PUPARIUM - 4.25 mm. long and 1.75 mm. wide; barrel-shaped and black with a metallic tinge. ADULT - Frons bare with trace of median stripe. Wing pattern reduced and variable, occasionally almost absent. Apical scutellar bristles about 0.3-0.4 times as long as basals. Coloration of body ash, with reddish-brown frons and light brown legs. Male smaller than female, which is about 6.5 mm. in length. Male - Sternite 4 wider than 5, which has a shallow indent and a distinctive, narrow median ridge on inner side, a slight ridge may appear on 4. Aedeagus vesica moderate, a large basal curved spine and a moderate setose rod. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies.)



Figures of Acanthiophilus eluta (Meigen): A - Adult female. B - Wing, showing variable pattern. C - Aedeagi, showing variation of setulae on rod (small figures - Indian specimen (left) and African specimen (right)). D - Sternites 4 and 5 of male.

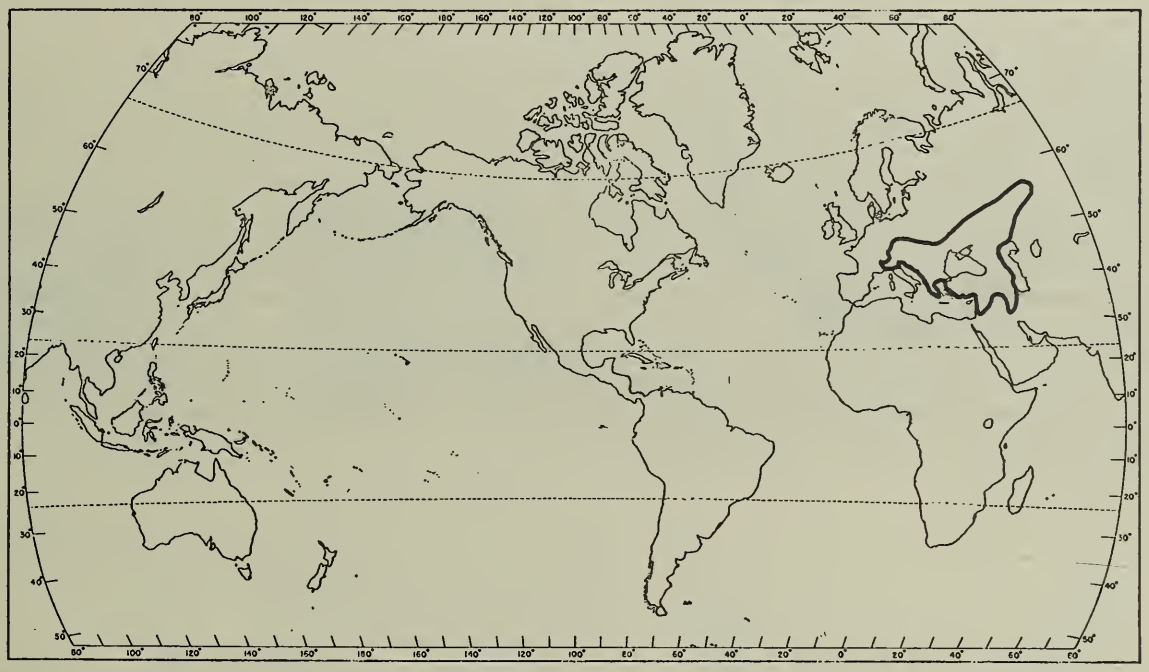
Major References: 1. Bytinski-Salz, H. 1952. Internatl. Cong. Ent. Trans. 9:745-750. 2. Feron, M. and Vidaud, J. 1960. Rev. de Path. Vet. et d'Ent. Agr. de France 39(1): 1-12. 3. Manolache, C. 1940. Viata Agr. 31:65. In Rum. 4. Munro, H. K. 1957. Ruwenzori Expedition 1934-35, 2(9):1023-1024. (Brit. Mus. (Nat. Hist.)). 5. Pruthi, H. S. and Bhatia, H. L. 1940. Indian J. Agr. Sci. 10(2):110-118. 6. Rusanova, V. N. 1926. Zhurn. Opuitn. Agron. Yugo-Vostoka 3(1). Reprint, 19 pp. In Rus.

Illustrations: Adult female from Feron and Vidaud; aedeagus, sternites and wing from Munro.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

WHEAT CHAFER (Anisoplia austriaca Hbst.)

Economic Importance: The genus Anisoplia is widespread in the Old World; it extends from Spain and France in Western Europe to the central Siberian lowlands in Asia. It also occurs in north Africa. Over 50 species or subspecies are recorded in the fauna of the USSR. Several species of the genus are recorded as being economically important pests, but A. austriaca is considered to be the most important. In the USSR, losses from this scarabaeid in the first part of the decade during 1870-1880 were 100,000,000 rubles. Large sums of money were appropriated and spent for control of the pest in the southern part of Russia in the 19th Century. It was reported under experimental conditions in Bessarabia (USSR) that hard varieties of wheat may be as much as 40 percent injured, with most of the grain being only partly eaten. Soft varieties of wheat do not suffer too much from the attacks of this insect. Spring-sown barley is attacked to some extent, but injury to oats is negligible. Cultural controls, such as plowing fields immediately after oviposition, planting early growing varieties of wheat, and controlling the adults will reduce damage considerably.



General Distribution of Anisoplia austriaca Hbst.

Distribution: Recorded in Albania, Austria, Bulgaria, Czechoslovakia, France (?), Germany (Bavaria), Greece, Hungary, Iran (Ardebil, Kurdistan and other western provinces), Italy (Venezia Giulia, Venezia Tridentina, Lombardy), Romania, Turkey, Syria, USSR and Yugoslavia.

Hosts: Wheat, barley, rye, oats and various native grasses, such as quackgrass, brome and timothy.

Life History and Habits: The biology as studied in the USSR is as follows: The life cycle, from egg to adult, takes 2 years. Adult emergence is quite variable, extending for nearly 2 months, but sometimes as little as one month. The peak

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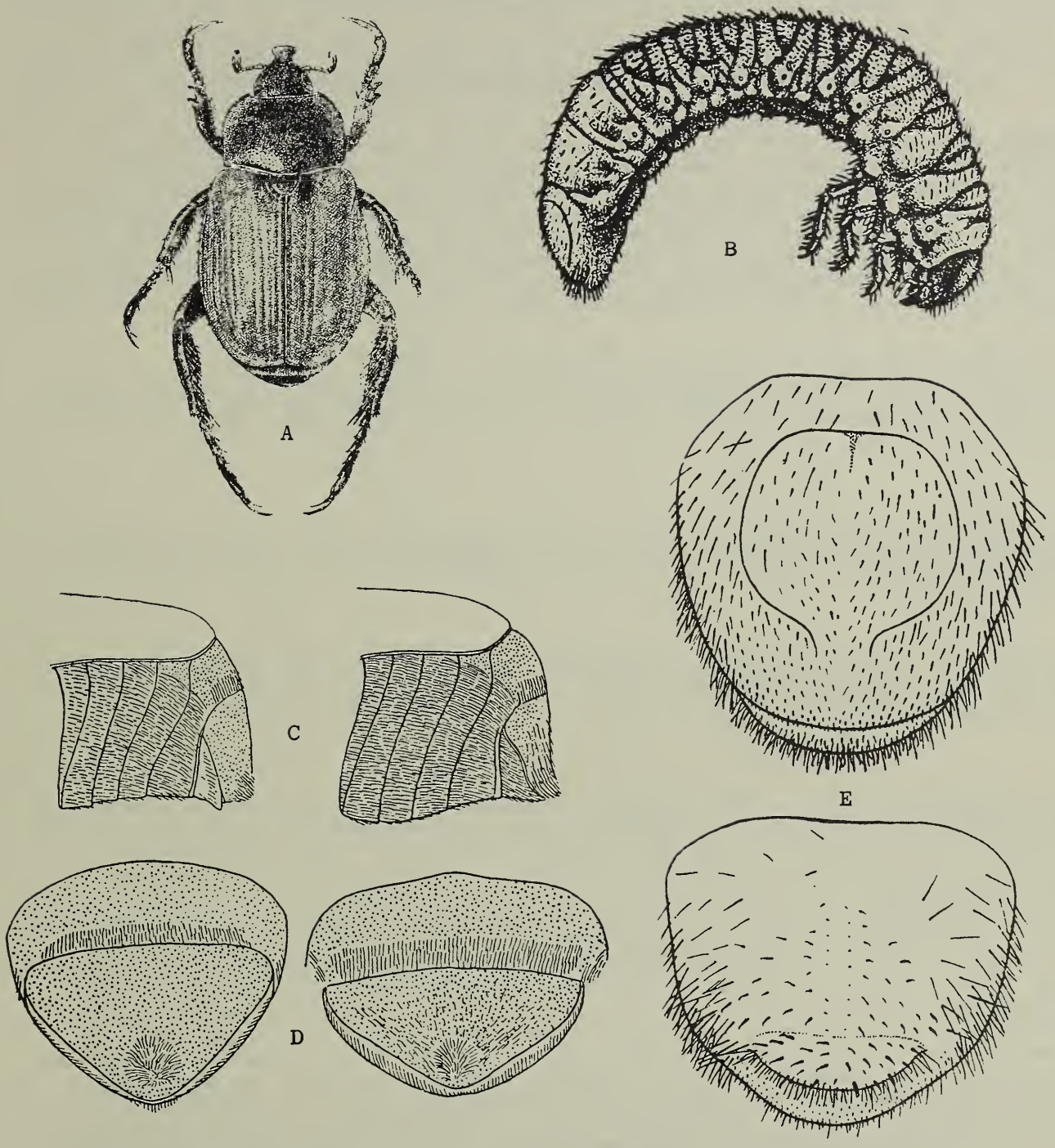
(Scarabaeidae, Coleoptera)

flight is variable; however, it generally takes place from mid-June to the first of July and lasts for not less than 2 weeks. Adults have been reported to live for 11-12 days to 3 weeks. They are light-seeking, and appear in the morning (9-10 a.m.). Adults first attack rye and winter wheat and afterwards spring wheat. During the daytime, they sit on the heads of grain, but in the evening they go down to the ground. On hot days, adults fly from one place to another, but in cloudy weather or when there is considerable wind or rain, they remain dormant. The female, when ready to oviposit, buries herself in the earth to a depth of 4-6 inches and deposits 30-40 eggs in rather small masses. They usually prèfer loose earth and in the general vicinity where feeding has occurred. Eggs hatch in about 3 weeks, and larvae begin feeding on humus and rootlets of different plants. The depth at which larvae live depends on the temperature and humidity of the upper strata of the soil; generally it ranges from about 2 to 8 inches except in the winter when larvae are hibernating, then the depth ranges from 14 to 32 inches. Larvae hibernate twice, once each winter and, in the 22nd month of their lives, transform to pupae. Pupation occurs in special chambers 4-6 inches deep in the soil the last of May or first of June. Adults emerge 2-3 weeks later. Heavy flight years may be predicted by obtaining data on the relative abundance of older larvae. However, climatic conditions may alter this situation. The pupa is very sensitive to every kind of condition of moisture and illumination.

Description: ADULT - Body large, thickset; 12.8-16 mm. or one-half to three-quarters inch in length. Appearance - elytra brown, pronotum dark green. Head and pronotum rather densely punctate. Pronotum narrows considerably in front and slightly behind, female elytra have swollen lateral margins, greatest width near middle. Elytra of both sexes with short, stout setae along lateral margins. Coloration of elytra almost uniform brown except for a dark green or black square spot on some, with the scutellum being the center of the spot at the base of the elytra; spot on male usually small or lacking. Pygidium rather densely covered with gray hairs at apex; ventral surface covered with close decumbent gray hair. Larger claw on anterior male tarsus long, strongly bent basally, sometimes with small median denticle on lower side, slightly recurved terminally and apically acute. LARVA - Full-grown larva whitish, 22.5 mm. or nine-tenths of an inch. Head reddish; anal opening diagonal. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies and the U. S. National Museum). CEIR 13(6):2-8-63.

(See illustrations on page 11)

Major references: 1. Edwards, W. H. 1880. The Grain Beetle and Means to Destroy it. 18 pp., St. Petersburg. (Manuscript of translation from Russian accompanied by 2 color plates). 2. Farahbakhsh, G. 1961. Dept. Plant Protect. Minist. Agr., Tehran. Pub. 1:103, Iran. 3. Horion, A. 1951. Verzeichnis der Kafer Mitteleuropas. II. p. 370, Stuttgart. 4. Junk, W. and Schenkling, S. 1915. Coleopterorum Catalogus. Part 66:163. 5. Medvedev, S. I. 1949. Fauna SSSR 10(3):239-272. 6. Porta, A. 1932. Fauna Coleopterorum Italica. Vol. V. p. 438, Piacenza.



Figures of Anisoplia austriaca Hbst.: A, adult male; B, larva; C, terminal abdominal segments of adult (male left, female right); D, pygidium (male left, female right); E, terminal segment of larva, dorsal view above and ventral below.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

A FRUIT-TREE SPIDER MITE (Tetranychus viennensis Zacher)

Economic Importance: This tetranychid mite has become of conisderable importance on fruit trees in various areas of Europe since it was first described by Friedrich Zacher in 1920. It has been known to occur in parts of Western Europe for many years, but was only recently found to be present in Greece, Turkey and Japan. It was considered serious on plum, apricot and peach during 1959 in Turkey, and damage was severe on apple locally in Greece in 1960. Apparently, this species has become of greater importance in Europe as a result of the widespread application of modern insecticides in orchards for the control of other pests.

T. viennensis has been intercepted on several occasions at U.S. Ports of entry. From 1958 through 1963, the pest was taken 3 times in Hawaii; twice at Seattle, Washington; and once each at Wilmington, North Carolina; Miami, Florida; and New York, New York.

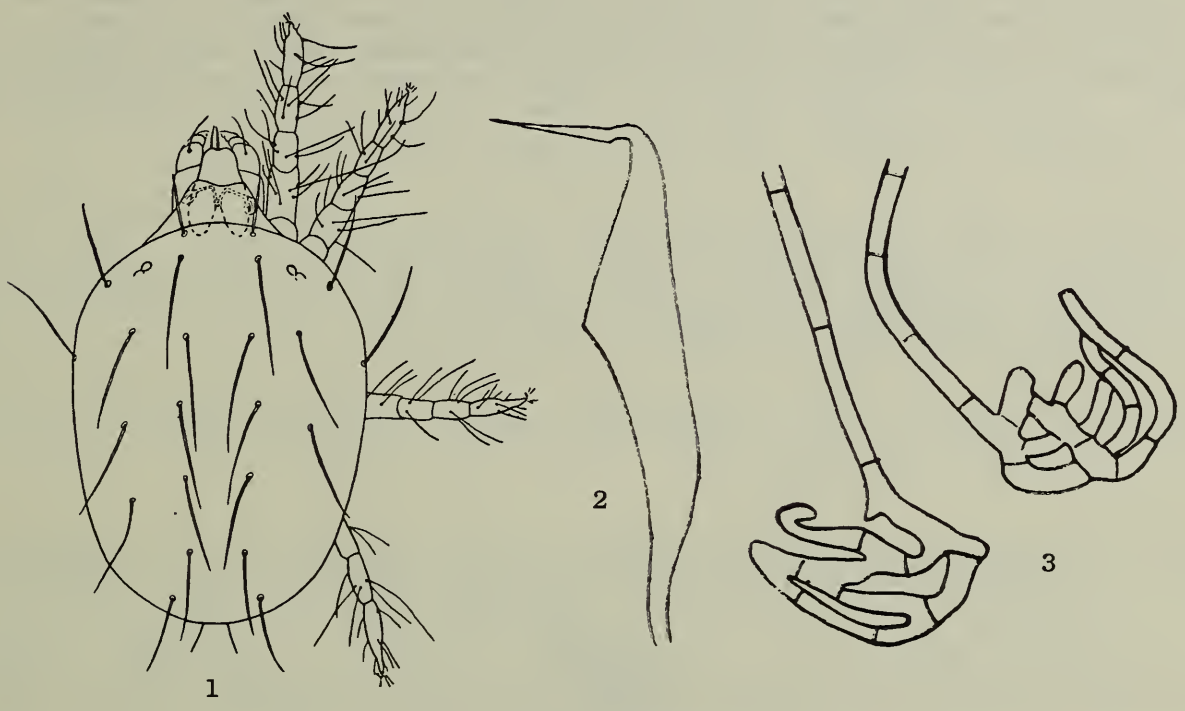
Hosts: Recorded on a number of hosts, including apple, pear, sweet and sour cherries, European birdcherry, quince, plum, peach, apricot, hawthorn, blackthorn and oak.

Distribution: Europe (recorded in Austria, Bulgaria, England, France, Germany, Greece, Hungary, Sweden and Switzerland). Also recorded in Turkey, U.S.S.R., China, Korea and Japan.

Life History and Habits: The biology as studied in the Mediterranean region of France on apples in 1953 is as follows: Females overwintered in groups, mainly in cracks in the bark or in the soil around the trees. They became active in the spring and dispersed to the young leaves. At Montpellier, they became active about March 25 and were found on all parts of the trees by April 7. They fed and oviposited on the lower surface of the outer leaves of the terminal buds. Natural mortality was high in the spring and increased still more in May and June owing to the activities of predators. However, large populations developed in the summer under the influences of high temperatures, long daylight hours, an abundance of mature leaves and the destruction of natural enemies by organic insecticides and acaricides. Maximum numbers were present in August and September, and the hibernating females were produced in early autumn and entered diapause in late September or early October when the critical photoperiod was 13 to 14 hours per day. The last males and eggs were seen in October. At Sapporo, Hokkaido, Japan, the mite was found to overwinter in the adult stage. Overwintered mites spend the winter much as they do in France and appear the next year on leaves of host trees from the end of May to the beginning of June. There are four or five generations a year in Hokkaido and an extra one at Kuroishi, Honshu, Japan.

Tetranychidae, Acarina

Description: FEMALE - This is a typical tetranychid mite, with the following exceptions. It is unique in having the distal ends of the peritreme anastomosing. Also, the dorsal striations are transverse on the posterior portion of the body as in Tetranychus pacificus. MALE - Aedeagus is bent sharply dorsad, and the distal knob is modified as a small anterior angulation near the base of the bent portion, with the caudal angulation very attenuated and tapering. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies.)



Figures of Tetranychus viennensis Zacher: 1, Dorsal View of Female; 2, Aedeagus; 3 Peritreme.

Major references: 1. Ehara, S. 1956. J. Facul. Sci. Hokkaido Univ. Ser. VI. Zool. 12(3):252-254. 2. Pritchard, A. E. and Baker, E. W. 1955. A revision of the spider mite family Tetranychidae. pp. 384-385, San Francisco. 3. Rambier, A. 1954. Acad. d'Agr. de France Compt. Rend. 40(8):340-343. 4. Zacher, F. 1920. Z. f. Angewandte Ent. 7(1):186-187.

Figures: Female from Ehara; peritreme and aedeagus from Zacher.

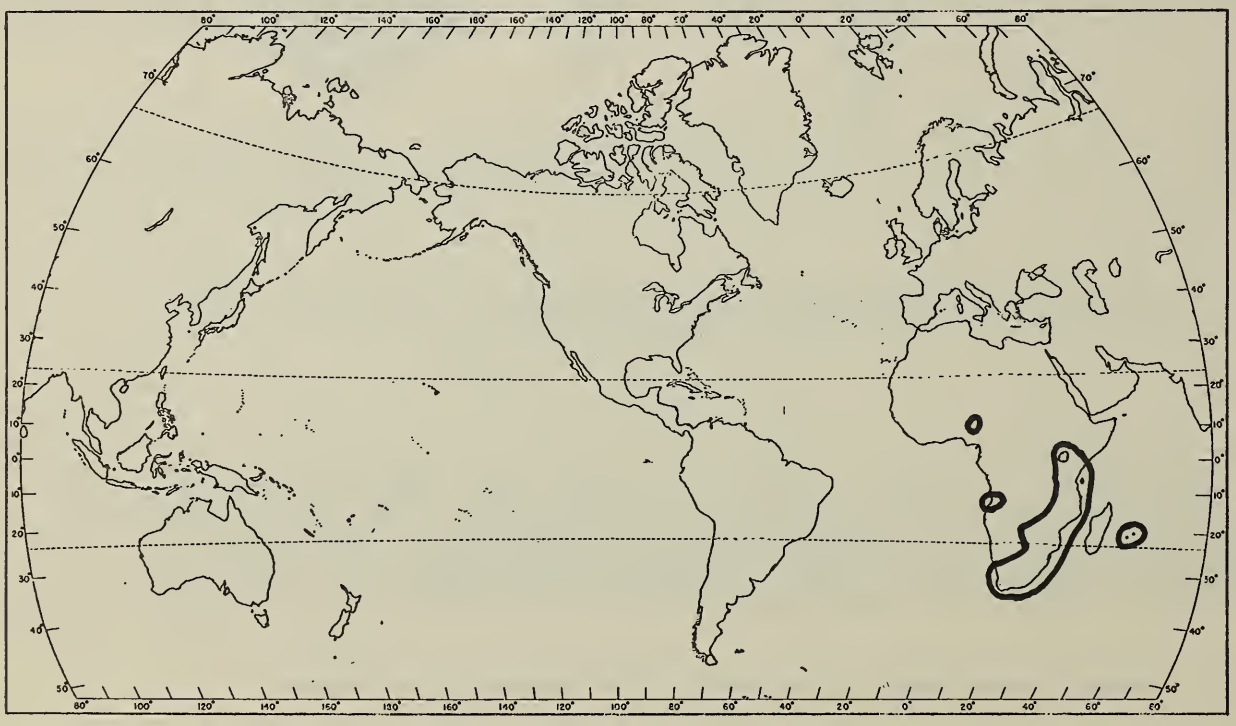
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

NATAL FRUIT FLY (Ceratitis rosa Karsch)

Economic Importance: The earliest record of this tephritid is in the original description by F. Karsch in 1887 from specimens collected at Delagoa Bay, Mozambique. By the turn of the century, it was recorded as a pest of economic importance in Natal Province, Republic of South Africa. Natal fruit fly is now considered the most common fruit fly of economic importance in Southern Rhodesia, and it has been reared from fruits from all parts of the eastern districts. About 1953, after accidental introduction to Mauritius, this fly became established and even largely replaced the Mediterranean fruit fly (Ceratitis capitata (Wied.)) as a pest of fruits. This situation, as to replacement, also probably occurred in Southern Rhodesia since it is thought that the Mediterranean fruit fly was more common in that country in previous years.

Hosts: This fruit fly infests most kinds of orchard fruits and a large number of wild ones. Only nut crops appear to be immune from attack. Included in those attacked are peach, apricot, apple, quince, guava, citrus, rose-apple, loquat and an indigenous fruit, Garcinia livingstonei. Of these hosts, peaches and guavas are particularly favored.

Distribution: Angola, Kenya, Mozambique, Nigeria, Nyasaland, Republic of South Africa, Southern Rhodesia, Swaziland, Tanganyika, Uganda, and the islands of Mauritius, Reunion and Zanzibar.



General Distribution of Ceratitis rosa Karsch

Tephritidae, Diptera

Life History and Habits: The Natal fruit fly overwinters in the adult stage and is able to withstand temperatures as low as 20°F., provided the warming period comes slowly. Food, water and shelter are more important overwintering factors than temperature. Overwintering flies feed on honeydew and require an abundant water supply. It was discovered that this species is not attracted to traps during the winter months.

Eggs are laid, 10 to 20 at a time, by the female just below the fruit surface. The fruit does not need to be damaged before eggs are laid, and eggs may be deposited in tissues of fruits long before ripening occurs. Where fruits are still very green, eggs may not hatch and may even be expelled by exudations from the fruit. Such exudations frequently indicate the presence of the fruit fly. Eggs usually hatch within four days after oviposition, but under cold conditions may take longer. Larvae develop rapidly and burrow throughout the tissues of the fruit. When removed from the fruit, larvae have a characteristic habit of arching themselves and leaping by sudden straightening. This characteristic is also noted in Mediterranean fruit fly larvae. There are three larval stages and a prepupal stage which occupy a total period of about 12 days, which will vary under different temperature conditions. When full grown, larvae leave the fruit and pupate below the soil surface. The pupal stage lasts 10-20 days. Emerging adults seek shady areas of trees during hotter hours, but are active during morning and evening hours. Females usually start ovipositing in about 7 days. During oviposition, females are quite active and may travel considerable distances, giving rise to a succession of generations appearing in different varieties and species of fruits as they ripen one after the other. Toward the end of the fruiting season, there is a large buildup of Natal fruit fly populations. Adults may live for several months, especially under mild conditions. All stages of the life cycle are influenced by climatic conditions, developing more rapidly under hotter conditions. There are about 10 generations a year.

Description: Body principally brown to tawny. Thorax dark brown laterally, the disc light brown pruinose with short, golden hairs and with a suggestion of a pair of brown longitudinal stripes, usually ending posteriorly in large spots. Pleura yellowish, becoming darker ventrally. Scutellum shiny black with a pair of narrow yellow lines interrupting its expanse. Wing pattern with small, black markings at base of disc and brown bands apically, mostly unconnected, much as in Ceratitis capitata (Wied.). Legs yellow, the mesothoracic tibiae of males (only) with dorsal and ventral brushes of elongated, bluish-black scales. Head, including antennae, yellow; face whitish without a black spot; no capitate hair in the males as in capitata. Yellowish abdomen with 2 transverse dark brown bands. Ovipositor sheath of female shorter than width at its base. Length 4-5 mm. or about three-sixteenths of an inch. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies. Description of adult furnished by Dr. Richard H. Foote).

(See illustration of adult female on following page)

Major references: 1. Carnegie, A. J. M. 1962. Rhodesia Agr. J. 59:229-235. 2. Froggatt, W. W. 1909. N. S. Wales Dept. of Agr. Farm. Bul. 24:50-51. 3. Monro, H. K. 1925. Union South Afr. Dept. Agr. Ent. Mem. 3:48-49. 4. Orion, A. J. E. and Moutia, L. A. 1960. Rev. Agr. et Sucrière de I'Ille Maurice (Mauritius) 39(3):142-150. 5. Comwlth. Inst. Ent. Distrib. map no. 153. 1962.

Adult Female of Ceratitis rosa Karsch

Drawing by
A. D. Cushman
ENT, ARS, USDA

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

BAGRADA BUG (Bagrada hilaris (Burm.))

Economic Importance: The bagrada bug is an important pest of crucifers and some other crops in parts of Africa and Asia. It damages plants much the same way as the harlequin bug (Murgantia histrionica (Hahn)) in North America and, from all reports, appears to be just as destructive, if not more so, than this bug. Bagrada bug has long been a pest of considerable importance in South Africa. It is abundant and destructive during the dry months, but is not serious during the wet months of the year. Damage has been estimated at hundreds of pounds sterling each year. Bagrada bug is also regarded as a major pest of crucifers in West Pakistan and India. B. picta F. and B. cruciferarum Kirk. are in synonymy with B. hilaris (Burm.).

Distribution: Recorded in Burma, Ceylon, Ethiopia, India, Iraq, Iran, Italy, Kenya, Northern and Southern Rhodesia, Republic of South Africa, Sicily, Tanganyika, West Pakistan, Uganda, United Arab Republic (Egypt) and U.S.S.R.

Hosts: Crucifers are the principal host plants, especially cabbage, turnip, rape, mustard, radish, cauliflower, etc. Plants of other families are also injured, but to lesser extent. Some of these cultivated crops are beans, peas, cowpeas, barley, oats, wheat, corn, sorghum, sugarcane, beet, carrot, foliage of citrus, hollyhock, artichoke, lettuce, chrysanthemum, dahlia, coffee and cotton. Among the native host plants are numerous crucifers and some grasses.

Life History and Habits: The biology as studied in Republic of South Africa is as follows: Eggs are laid under lumps of soil; usually singly, but sometimes in two's and three's. Hatching occurs in 8 to 14 days, depending on the temperature. Nymphs molt five times in 50 to 81 days. They feed largely during daylight hours when it is warm, hiding during the late afternoon and night between leaves of plants, under lumps of soil and in rubbish of gardens and fields. Adults are very active and migrate rapidly. Pairing takes place soon after the bug reaches the adult stage and, shortly after copulation, the males die. The females deposit eggs 7 to 10 days later and then die in 8 to 14 days. The number of generations is variable and they overlap. Four or five is the usual number. The total number of days for development ranged 58 to 81 days in the insectary at Pretoria during 1914-1915 and 1916-1917. Weather conditions are important factors influencing development. Wet and cold conditions retard development a number of days.

In India, it was observed that this pest was greatly susceptible to changes in weather conditions and its populations varied in accordance with the shelter available in the crop. It protected itself from cold of winter or heat of summer by remaining under thick foliage, weedy or lodged crop, within the loose folds of leaves, crevices in soil or interspaces under clods, and it migrated from the crop which did not provide it suitable shelter. When disturbed, the pest ran in all directions and adults took flight only when greatly disturbed. The suitable temperature range for feeding was 70° F. to 102° F., with 90° F. being the optimum. It was rarely found feeding under exposed conditions. Peak populations occur during the spring.

Pentatomidae, Hemiptera

Description: Coloration and markings variable, depending on the area. In South Africa, the description is as follows: EGG - Broadly oval, less than one mm. in length; creamy-white at first, turning orange to reddish. NYMPH - First stage about one mm. in length. Head and thorax black. Abdomen deep orange with row of black spots down center and another of black triangles around edge; black spots become larger after each molt until only a few reddish spots remain on abdomen. ADULT - Small, depressed, 4-7 mm. (0.16-0.28 inches) in length, male only about two-thirds as large as female. Triangular in general outline. General color black, with numerous symmetrically arranged orange and yellow streaks and spots on both dorsal and ventral surfaces; ventral surface nearly all yellow in most specimens. (Prepared in Survey and Detection Operations, in cooperation with other ARS agencies).

Adults of Bagrada hilaris (Burm.), Showing Variation

Major References: 1. Batra, H. N. 1958. Indian J. Ent. 20(2):130-135. 2. Distant, W. L. 1902. Fauna of British India. Rhynchota, Vol. I:193-194. 3. Gunn, D. 1918. Union of South Afr. Dept. Agr. Bul. 9, 16 pp. 4. Howard, C. W. 1907 (?). Transvaal Dept. Agr., Div. Ent. Leaf. 9, 6 pp. 5. Le Pelley, R. H. 1959. Agricultural Insects of East Africa. p. 55, Nairobi. 6. Stichel, W. 1961. Illustrierte Bestimmungstabellen der Wanzen. II. Europa 4(24):757.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PIGMY MANGOLD BEETLE (Atomaria linearis Stephens)

Economic Importance: This cryptophagid beetle is recorded as a pest of sugar beets in Europe. In some instances, damage has been reported as severe. Replanting of the crop, two or three times, has occurred in Czechoslovakia in certain seasons, and the pest is sometimes very troublesome in Germany and Holland, particularly where crop rotation is not followed. In England, mangolds suffer the greatest damage. The beetle attacks the young seedling plant just below the soil level, producing an injury somewhat similar to that attributed to springtails, except that the latter is above the soil level. Injury is also caused to the roots, and a certain amount of feeding takes place upon the epidermis of the leaves. The most serious damage, however, is that caused to the seedling plants.

Atomaria linearis has been intercepted on three occasions at U. S. ports of entry; twice at New York, New York, and once at District of Columbia Inspection House.

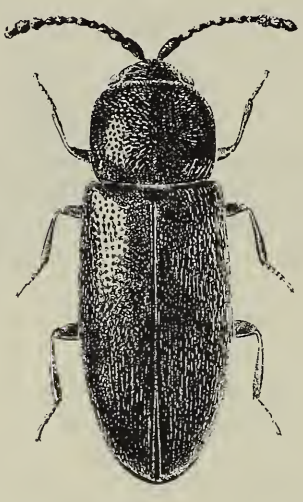
Distribution: Europe. It has also been reported to be present in north Africa, but Aguilar (1) questions the validity of these records.

Hosts: Beets (sugar and garden), mangel and mangold are the principal hosts. Other plant hosts favoring reproduction of this insect include spinach, radish, marjoram, Polygonum aviculare, lambsquarters goosefoot (Chenopodium album) and chickweed (Stellaria media). Adults may occasionally feed on germinating seeds of many other plants.

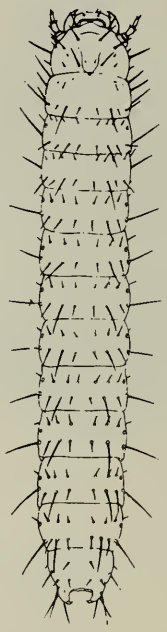
Life History and Habits: Adults hibernate in the soil and can descend to 6 inches or more. The sexually developed forms hibernate beneath vegetable debris, generally in places where they have developed. They begin activity with warm weather, often in March. Toward the end of April, they can be found around the germinating seed or on very young plants. Dispersal takes place by flight from crop to crop, or from hibernation quarters to crops. Adults disappear from beet crops by the end of the summer. They may survive as long as 178 days. Mating reaches a peak in May. Females deposit eggs singly in the soil, each laying from 20 to 50 eggs. Incubation lasts 4-6 days in the laboratory. Larval development takes 5-6 weeks. The larvae live in the root systems of certain plants at a depth of around 16 inches. Pupation lasts from 13 to 16 days. The new adults appear in June, with dispersal occurring in July and August. There are two population peaks; one at the end of spring (hibernating adults) and the other at the end of summer (adults of new generation).

(Cryptophagidae, Coleoptera)

Description: ADULT - Length 1-2 mm. Color variable, from deep red to black. Body flattened, elongate, parallel-sided. Thorax rather long and broad, finely punctured, base marginated; base of pronotum lightly marked. Head finely punctate; eyes relatively small; antennae brown, the three apical segments dilated forming a straight club. Elytra densely punctate and covered with fine tawny pubescence. Legs reddish brown. LARVA - Measures 0.5 mm. at hatching and reaches 3 mm. at last instar. Head capsule and last segment almost colorless. Epicranial suture short but visible; mandible with bifid teeth; labial palp two-jointed; antenna three-jointed. Ninth abdominal segment is produced on each side into horn-like processes which curve inward and up. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies).



Adult of Atomaria linearis Stephens



Larva of Atomaria linearis Stephens

Major references: 1. Aguilar, J. d'. 1962. In A. S. Balachowsky's Entomologie Appliquée a l'Agriculture, I:330-335. 2. Newton, H. C. F. 1932. Ann. Appl. Biol. 19(1):87-97. 3. Petherbridge, F. R. and Stirrup, H. H. 1935. Gt. Brit. Ministry of Agr. and Fisheries Bul. 93:16-17. 4. Smith, K. M. 1948. A Textbook of Agricultural Entomology. pp. 94-95, Cambridge, England.

Figures: Adult from Balachowsky and Larva from Newton.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

INDIAN COTTON JASSID (Empoasca devastans Distant)

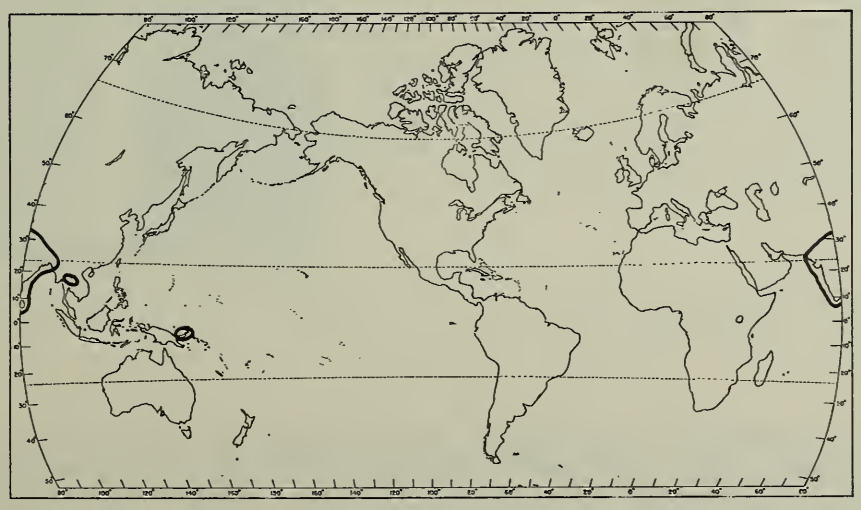
Economic Importance: This cicadellid is a well known major pest of cotton, and the most important representative of the genus Empoasca on the Indo-Pakistan sub-continent. The pest came into prominence early in the 1900's when it was found attacking American varieties of cotton newly introduced in the Punjab. Since then, it also has been reported as being serious on okra, potato, tomato and pepper. The latter three were severely damaged during 1957-58 in West Pakistan, principally in the southern regions of the country. E. devastans sucks the sap from cotton leaves causing them to shed. This results in a shedding of bolls by the plant and a reduction in the quality of lint produced by bolls remaining on the plant. Susceptible varieties often suffer a 25 percent or greater loss.

Among other species of Empoasca, E. kerri var. motti Pruthi and E. punjabensis Pruthi occur with E. devastans on cotton in the Punjab. Studies conducted during 1940-42 showed that populations of the latter were low in some localities early in the season, but the percentage increased slowly and reached a high figure towards the end of the season, and was more evident in the southwestern part of the Punjab than elsewhere.

Because of the seriousness of this pest on American varieties of cotton in the Punjab, preventive and protective measures became essential. Research studies, which began in 1937, indicated that the hairiness of the leaf vein appeared to be the most important factor in resistance, and the use of hairy varieties of cotton is recommended where infestations are heavy. Tree cotton and its varieties are practically immune.

Distribution: Ceylon, India, Pakistan (both East Pakistan and West Pakistan), Thailand (northern) and New Britain. Recent records (Ghauri, 1963) show that the distribution of E. devastans extends further to the east than recorded formerly, and approaches that of E. terraereginae Paoli, which is restricted to Queensland, Australia. The latter species is also a serious pest of cotton.

Hosts: Cotton, okra, potato, tomato, eggplant, pepper, kenaf hibiscus, linden hibiscus (emajagua), hollyhock, castorbean, sunflower, Hindu datura and cacao.



Distribution of Empoasca devastans Distant

Cicadellidae, Hemiptera

Life History and Habits: The biology as studied in the Punjab is as follows: Full-grown cotton leaves, 35-45 days old, are preferred for oviposition. Infestation begins the latter part of June or early July, six weeks after planting, reaches a peak the last half of August and practically disappears by the beginning of November. High atmospheric humidity was found to be the chief factor favoring the increase. Eggs are laid inside the leaf veins, usually in the spongy parenchymatous layer between the vascular bundles and the epidermis and have an incubation period of about 4-11 days. A female may lay up to 29 eggs. Nymphs molt 5 times. This stage requires from 7 days in the fall to 21 days during the winter. Unmated adults of E. devastans lived for 90 days or longer, but paired adults did not survive beyond 5 weeks in summer and 7 in winter. A total of 11 generations a year have been observed, but adults are long-lived and the oviposition period is extended; therefore, there is considerable overlapping of broods.

Description: ADULT - Head, pronotum and scutellum pale ochraceous; vertex with two black spots on apical margin; face with the lateral areas more or less distinctly pale brownish; body beneath pale ochraceous; legs and tegmina pale greenish-ochraceous, the latter with a black spot near apex of each claval area; vertex of head short, concially rounded anteriorly, more than half as long as breadth between eyes; pronotum with three grayish-white spots near anterior margin; scutellum spotted with grayish-white; tegmina extending far beyond abdominal apex. Length excluding tegmina 3 mm. The above adult description is the original by W. L. Distant (3). The most noteworthy feature by which the adults can be recognized in the field is the presence of a prominent black spot on each of the tegmina near apex of the claval area. Seasonal changes in coloration are also present. The summer form is yellowish-green with antennae pale white, eyes a mosaic of green and white, tegmina with greenish tinge and legs pale green. The winter form is reddish-brown with antennae pale white, eyes dark violet, tegmina with a brownish tinge and legs green. In between these two extremes, there may be many intermediate forms depending upon the time of year. Descriptions of the various nymphal stages are given in Husain (5). (Prepared in Survey and Detection Operations in cooperation with other ARS agencies).

Adult of Empoasca devastans Distant

Major references: 1. Abbas, M. and Afzal, M. 1946. Ind. J. Agr. Sci. 15(3):119-124. 2. Afzal, M. and Ghani, M. A. 1953. Sci. Monogr. Pakistan Assoc. Advanc. Sci. no. 2, 102 pp. 3. Distant. W. L. 1918. The Fauna of British India -- Rhynchota. Vol. 7 Homoptera; appendix. Heteroptera: addenda 210 pp. 4. Ghauri, M. S. K. 1963. Bul. Ent. Res. 53(4):653-656. 5. Husain, M. A. 1940. Ind. J. Ent. 2(2):123-136.

Illustration of adult from Husain.

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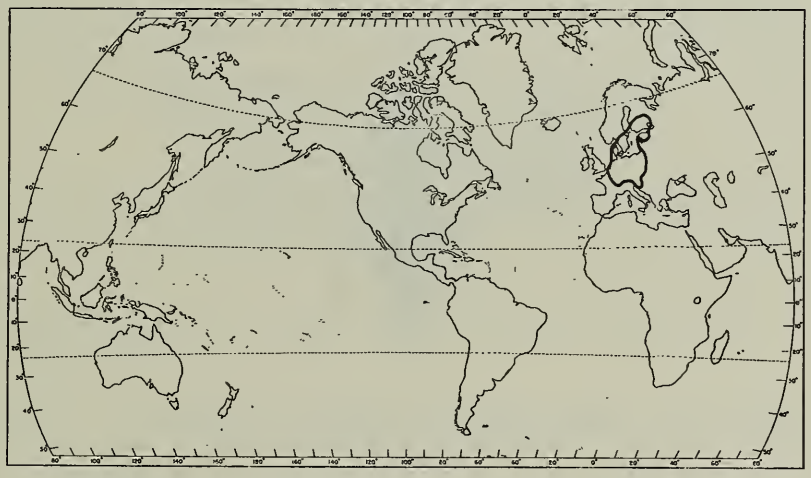
Illustration of adult from Husain.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

SMALL SPRUCE SAWFLY (Pristiphora abietina (Christ))

Economic Importance: This tenthredinid is an important pest of spruce in areas of northern and central Europe. Outbreaks have been reported in the Netherlands, Denmark, Germany, Poland, Czechoslovakia and Switzerland. Damaging infestations may last for several years. The pest caused considerable damage to Norway spruce in south Jutland, Denmark, between 1940 and 1950, and further controls were needed in 1955, 1956. Great losses were reported to spruce near Freiberg, Germany, in 1950; apparently the result of increased populations when favorable dry soil conditions facilitated the pupation of larvae. In Switzerland, it was confirmed that infestations begin in young plantations and then spread to older trees if the soil is favorable for pupation. The deformations of the crowns of spruce caused by infestation may result in the growth of the trunk being reduced by about 70 percent; however, it was found that few of the trees are killed even if attacked year after year and, when the outbreak ends, the crowns recover in a few years. Spruce grown in mixed stands with beech were protected in that the ground cover was rendered unfavorable for the cocoons of the sawfly.

Distribution: Recorded in Austria, Belgium, Czechoslovakia, Denmark, Estonia SSR, Finland, France, Germany, Netherlands, Poland, Sweden, Switzerland and Yugoslavia (Sarajero).



General Distribution of Pristiphora abietina (Christ)

Hosts: Engelmann spruce, Norway spruce, Sitka spruce, blue spruce and Serbian spruce.

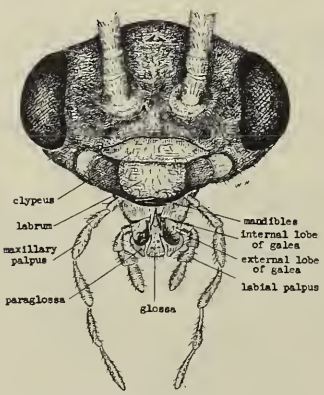
Life History and Habits: The biology, as studied during 1938-40 in the area known then as East Prussia, is as follows: In 1939, adults began to emerge in mid-May and continued for three weeks, and oviposition was in progress between May 24 and June 25. Up to 14 eggs were laid in the needles on shoots about an inch long, but only one per needle. Most eggs were laid on younger spruces during the first half of the period, and on older spruces during the second half. Eggs were unusually abundant on young trees, despite the small numbers of cocoons found beneath them, so that migrations of the adults must be assumed. Because of the long oviposition period, all stages of development, egg to full-fed larvae, occur together. Larval development appeared to be most rapid on older spruces, but there was considerable variation. Larvae were most numerous June 5-14.

(Tenthredinidae, Hymenoptera)

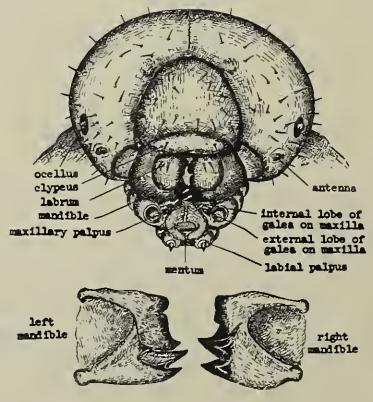
Earlier studies conducted in Switzerland indicate the following additional information. In the Swiss plateau, adults appear in May or early June, the males usually a few days before the females. In the laboratory, females laid 80-100 eggs each. For oviposition, the spruce shoot must be free of bark scales, but the individual needles of the young shoot must still form a compact whole. The egg is laid in a slit cut in a needle well protected in the May shoot. Larvae hatch in 3-5 days and are ready to spin cocoons 12-20 days later. If the oviposition period has been prolonged, however, larvae may be found on trees up to 5 weeks. The male larvae have 4 instars and the females 5. Cocoons are spun in the ground litter or in the surface layer of soil, and are most abundant under moss or in places with humus, while only few occur in litter from deciduous trees or under brambles. Pupation takes place about 2 weeks prior to adult emergence in the spring.

Description: ADULT - Length of male 4.5-5 mm. or about 1/4 of an inch; female 5-6 mm. Female mostly black, with area around mouth, pronotum, tegulae, and sides and apex of abdomen yellow. Male mostly dark yellow, with spot on frons, posterior surface of head, mesonotum, metanotum and most of dorsum of abdomen black. Legs the same in both sexes; mostly yellow, with dark brown shading at bases of all coxae, at apices of middle and hind femora, and tibiae and on hind tarsi. Sheath of the saw, ventral view, not notched at the tip. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies. Description mostly furnished by Dr. B. D. Burks).

Female of Pristiphora abietina (Christ)



Head of Female



Head of Larva

Major references: 1. Nageli, W. 1936. Mitt. Schweiz. Anst. Forstl. Versuchsw. 19(2):213-381. 2. Niklas, O. F. 1943. Z. Angew. Ent. 30(2):224-251.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

OLD WORLD SCREW-WORM (Chrysomya bezziana Villeneuve)

Economic Importance: This is the most important myiasis-producing calliphorid in areas of Africa and Asia. It is reported to rank second in importance to the tsetse flies as a pest of cattle in central and southern Africa, and is of considerable importance as a pest of man in India. Cattle are the chief hosts, by and large, but man is apparently attacked with relatively more frequency in India than in other parts of the fly's range. Larvae may attack wounds on various parts of the body; in man, infestation of head wounds seems most frequent. C. bezziana is a specific myiasis-producing fly; it cannot breed in carrion or excrement, and is dependent upon living tissue for its existence. Its habits are similar to the American screw-worm (Cochliomyia hominivorax (Coquerel)) in this respect.

The genus Chrysomya is confined to the Old World, and restricted to the tropical and semi-tropical regions. James (2) also lists 7 other species: C. chloropyga (Wiedemann) is the most important sheep maggot in South Africa, but the other species, C. marginalis (Wiedemann), C. megacephala (Fabricius), C. albiceps (Wiedemann), C. rufifacies (Macquart), C. putoria (Wiedemann) and C. micropogon (Bigot) are primarily secondary invaders or scavengers, and are not generally regarded as major pests. They might be compared with the secondary screw-worm (Cochliomyia macellaria (Fabricius)) of the Americas when considering their importance. Occasionally, however, some form of myiasis is attributed to some of the aforementioned Chrysomya, but C. bezziana is by far the most important of the species.

Distribution: Central and southern Africa, and parts of Asia (India, Ceylon, Burma, Thailand, Indo-China, Philippines).

Hosts: Numerous wild and domestic animals, as well as man.

Life History and Habits: The biology as recorded in India is as follows: Eggs are laid singly or in batches inside wounds, sometimes on the unbroken skin covering bruises and abscesses, and occasionally on places soiled by septic exudations and blood from wounds. Eggs hatch in about 18-24 hours. Young larvae feed on liquids exuding from the interior of the wound for about a day; later they become embedded in the living tissue. In about 6 days, the larvae become full fed, leave the wound and drop to the ground where they bury themselves about an inch beneath the surface of the soil. Pupation takes place in 1-2 days and lasts 7-9 days in hot weather of the wet season, but much longer in the cold weather of the dry season. The biotic potential of the fly is enormous; a female may produce 500-600 eggs and there may be 8 or more generations a year.

Description: ADULT - Head black on the upper surface except for the frontalia or central stripe of the front; orange on the face, antennae and palpi. Thorax and abdomen green to bluish-purple, with narrow, black posterior margins on the intermediate abdominal segments. In the female, the front is almost parallel-sided and the sides of the frontalia do not bulge in the middle. In the male, the facets of the eyes are uniform, there being no definite upper zone of larger facets and lower zone of smaller ones such as characterizes the common C. megacephala with which C. bezziana can easily be confused. The stigmatal bristle is

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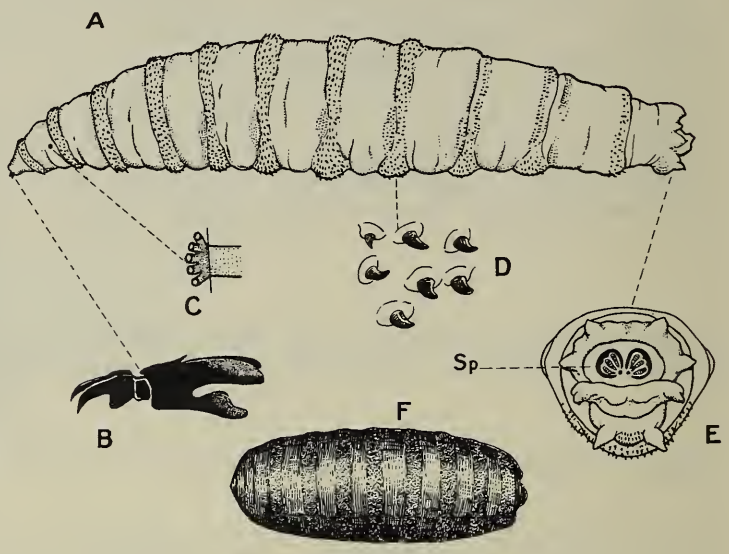
(Calliphoridae, Diptera)

well developed, the mesothoracic spiracle is brownish and the squamae are waxy-white. Length 8-12 mm. or about one-half inch. MATURE LARVA - Creamy-yellow, 14-18 mm. or about five-eighths of an inch in length and with only the usual protuberances. Mouth hooks strong. Spines in belts along the incisures are strong, being visible to the naked eye, and recurved; there are several irregular rows of spines to each belt. Anterior spiracles terminate in 4 or 5 finger-like processes.

Chrysomya bezziana adults differ from the American Cochliomyia in several ways. One differing character easy to see is the number of mesothoracic stripes; 3 prominent, black stripes will be present in Cochliomyia, while only 2 narrow, longitudinal stripes will be present on C. bezziana. The full-grown larvae also differ in several ways. An easy, recognizable character to use would be the number of finger-like processes on the anterior spiracles; C. bezziana will have 4-5, while Cochliomyia hominivorax will have 7-9 and Cochliomyia macellaria will have 9-11. (Prepared in Survey and Detection Operations in cooperation with other ARS agencies).

Chrysomya bezziana, adult female



C. bezziana: A - Larva. B - Cephalopharyngeal skeleton. C - Anterior spiracle (much enlarged). D - Spines (much enlarged). E - Posterior end, showing spiracles. F - Pupa.

Major references: 1. Cuthbertson, A. 1934. Rhodesia Agr. J. 31(4):256-258. 2. James, M. T. 1947. U. S. Dept. of Agr. Misc. Pub. 631:72-74. 3. Patton, W. S. and Evans, A. M. 1929. Insects, Ticks, Mites and Venomous Animals of Medical and Veterinary Importance. Pt. I. Medical. pp. 406-495, Croydon. 4. Smart, J. 1956. A Handbook for the Identification of Insects of Medical Importance. Ed. 3 pp. 76-77, London.

Illustrations: Drawing of adult female by A. D. Cushman, USDA. Figures of larva, cephalopharyngeal skeleton, anterior spiracle, spines, posterior spiracles and pupa from Cuthbertson.

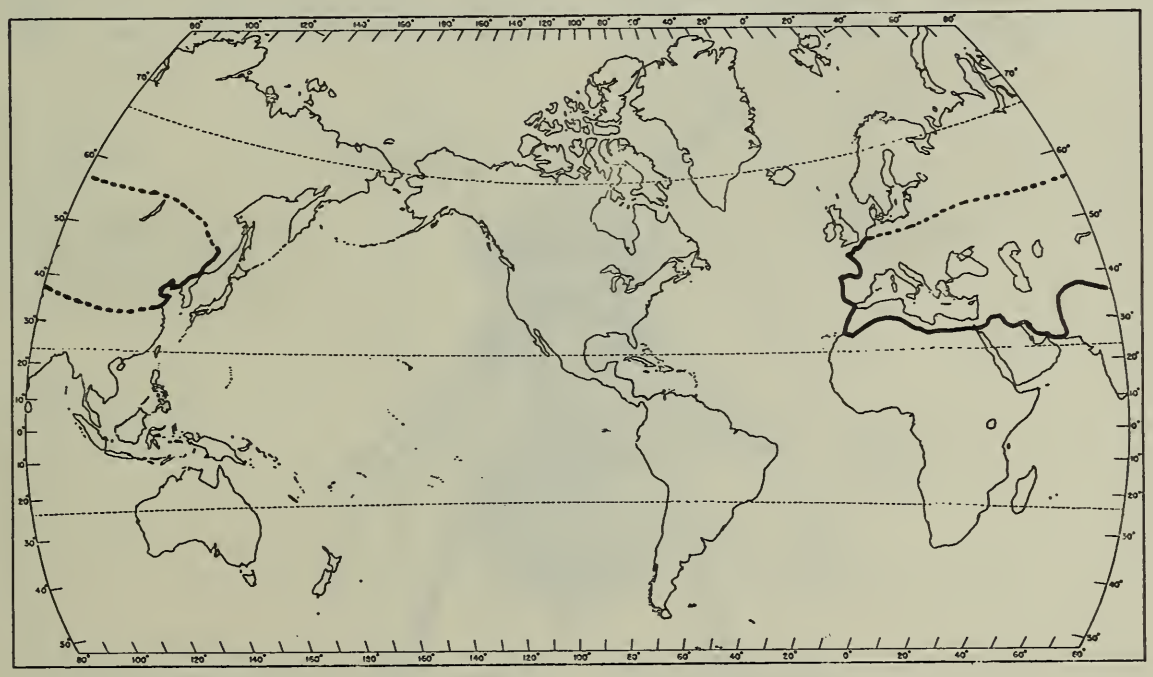
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

A SPOTTED FLESH FLY (Wohlfahrtia magnifica (Schiner))

Economic Importance: This sarcophagid is regarded as a specific myiasis-producing fly of considerable importance in areas of southern Europe, the Middle East and north Africa. It attacks both man and animals. The females of this species are attracted to larviposit in sores, cuts, wounds, sore eyes, a diseased nose, ear, vagina and also in soiled wool, but larvae never penetrate the digestive organs and are not known to cause myiasis of the digestive tract.

Man is frequently attacked in areas where a nomadic life is the custom. People in this type of environment expose themselves to attacks of the parasite. It is dangerous to sleep out-of-doors between 10 a.m. and 4 p.m. in the summer months in areas inhabited by the fly. In man, the nose, eyes and ears are most frequently attacked. Deafness may result from auditory myiasis and destruction of tissue in the nasal regions is often quite severe, with death being the result in some cases. Myiasis of the eyeball may result in the complete destruction of that organ. The larvae may also deeply penetrate into thick muscles and damage them severely.

In animals, myiasis is particularly common during the summer when even the smallest wound will become infested. The pest is particularly dangerous to cattle during epizootics such as foot and mouth disease.



General Distribution of Wohlfahrtia magnifica (Schiner)

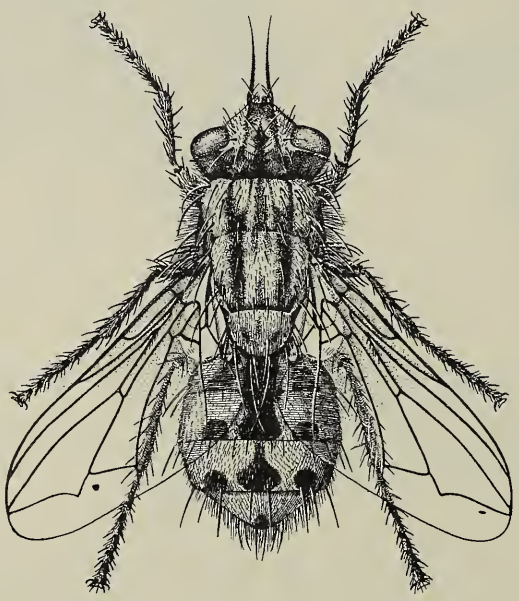
Distribution: Widely distributed in southern Europe, north Africa, Near East and the Asiatic portion of the U.S.S.R., and extends to Manchuria, Mongolia and China in the Far East. James (1) also records the species in Natal, Republic of South Africa. The species is apparently not known to occur in England, Netherlands, Scandinavia, Finland and the northern part of the U.S.S.R.

(Sarcophagidae, Diptera)

Hosts: Attacks man and many wild and domestic animals, i.e., horses, cattle, sheep, swine, dogs and fowl, particularly geese.

Life History and Habits: The adults of this species rarely enter buildings, but frequent fields, orchards and other open places. Females are flower feeders until they become sexually mature. They like warmth and light, therefore they do not fly during early morning and late evening hours, or in dark, gloomy weather. Each female, after mating, will deposit from 124 to 169 larvae which burrow into the tissue and molt in 2 or 3 days. The third-stage larvae become full grown in another 3 to 4 days, then crawl out of the wound to pupate. Larvae are relatively large and extremely hardy. The reproductive potential of the species is great; numerous generations are produced annually.

Description: ADULT - Antennae black, at most the apex of the second segment being yellowish or reddish; third segment half again to twice as long as the second; arista short-pubescent. Palpi black. Eyes broadly separated in both sexes, more so in the female than in the male. Radial vein 1 of wing is bare. Lateral abdominal spots rounded and well defined; median spots on first 3 segments each reach base of respective segment, forming a connected band; fourth segment has 3 small spots at apex. Length 10 mm. or 3/8 of an inch. LARVA - Anterior end tapers strongly from middle toward front; general form much more robust than in Sarcophaga larvae. Posterior end truncate, spiracles being located in a pronounced depression or posterior cavity; above and below cavity are 12 tubercles. Anal area on posterior face of last apparent segment or enlarged area. Prominent spinous areas present. Spines coarser than in Wohlfahrtia vigil (Walker), a North American species. Also, anterior spiracle has 5 or 6 papillae, whereas anterior spiracle has 9 or 10 papillae in W. vigil (Prepared in Survey and Detection Operations in cooperation with other ARS agencies).



Adult Female of Wohlfahrtia magnifica (Schiner)

Major references: 1. James, M. T. 1947, U. S. Dept. Agr. Misc. Pub. 631:36-39. 2. Neveu-Lemaire, M. 1938. Traité d'Entomologie Médicale et Vétérinaire. pp. 840-841, Paris. 3. Patton, W. S. and Evans, A. M. 1929. Insects, Ticks, Mites and Venomous Animals of Medical and Veterinary Importance. Part I. Medical. pp. 452-493, Croydon, England. 4. Portchinsky, I. A. 1916. Bur. Ent. Sci. Com. Min. Agr. Mem. (Petrograd) 11(9):1-108. In Rus.

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1/ See scientific name change, page 32
2/ Recorded in the U.S. in 1962

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3/ Recorded in U.S. in 1959

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5/ Recorded in U.S. in 1962
6/ See scientific name change, page 32
7/ Recorded in U.S. in 1959
8/ See scientific name change, page 32

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Cereal leaf beetle - Oulema melanopa (L.)

Paddy borer - Tryporyza incertulus (Walk.)

Plum fruit moth - Grapholitha funebrana Treitschke

Plum tortricid - " " "

Red plum maggot - " " "

Rice stem borer - Tryporyza incertulus (Walk.)

Soybean pod borer - Leguminivora glycinivorella (Matsumura)